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WHAT IS CLAIMED IS: —

1 1. An intercoupling component for receiving an array of contacts within a digital or
2 analog transmission system having an electrical ground circuit and a chassis ground circuit,
3 the intercoupling component comprising:

4 a segment formed of electrically insulative material and having an upper and lower
5 surface, the segment including a plurality of holes disposed on its upper surface and arranged
6 in a predetermined footprint corresponding to the array of a contacts; and

7 a shield member formed of electrically conductive material and at least partially
8 disposed within the segment and configured to electrically connect to the chassis ground
9 circuit.

1 2. The intercoupling component of claim 1, further comprising:

2 a plurality of electrically conductive signal contacts configured to transmit a digital or
3 analog communication signal, each signal contact disposed within a hole on the upper surface
4 of the segment forming an array of signal contacts, and wherein the shield member is at least
5 partially disposed within the array of signal contacts.

1 3. The intercoupling component of claim 2, further comprising:

2 a plurality of electrically conductive reference contacts each disposed within a hole
3 on the upper surface of the segment, wherein the electrically conductive reference contacts
4 are configured to electrically connect to the reference ground circuit of the system.

1 4. The intercoupling component of claim 3, wherein the plurality of electrically
2 conductive reference contacts is disposed within the array of signal contacts.

1 5. The intercoupling component of claim 2, further comprising:

2 a ground plane disposed at least partially within the segment and within the array of
3 signal contacts, and wherein the ground plane is configured to electrically connect with the
4 reference ground circuit of the system.

- 1 6. The intercoupling component of claim 5, further comprising:
2 a plurality of ground planes disposed at least partially within the segment and within
3 the array of signal contacts, and wherein the plurality of ground planes is configured to
4 electrically connect with the reference ground circuit of the system.
- 1 7. The intercoupling component of claim 2, further comprising:
2 a frame formed of electrically conductive material at least partially surrounding the
3 segment and in electrical contact with the shield member and configured to electrically
4 connect to the chassis ground circuit.
- 1 8. The intercoupling component of claim 1, wherein the segment has a contiguous edge
2 defining its perimeter, and the shield member is disposed within the segment and surrounds
3 the perimeter of the segment.
- 1 9. The intercoupling component of claim 7, further comprising a plurality of shield
2 members disposed within the segment and each in electrical contact with the frame.
- 1 10. The intercoupling component of claim 1, wherein the segment is molded at least
2 partially around the shield member.
- 1 11. The intercoupling component of claim 2, wherein the segment further includes at
2 least one cavity filled with air disposed on the segment and within the array of signal
3 contacts.
- 1 12. The intercoupling component of claim 3, further comprising a retention member
2 configured to releasably retain the array of contacts with the plurality of signal contact and
3 reference contacts.
- 1 13. An intercoupling component for receiving an array of contacts within a digital or
2 analog transmission system having an electrical ground circuit and a chassis ground circuit,
3 the intercoupling component comprising:

4 a plurality of segments formed of electrically insulative material, spaces between
5 adjacent segments defining at least one gap, each segment having an upper and lower surface
6 and including a plurality of holes disposed on its upper surface and arranged in a
7 predetermined footprint corresponding to the array of a contacts; and

8 a shield member formed of electrically conductive material disposed within at least
9 one gap between adjacent segments and configured to electrically connect with the chassis
10 ground circuit of the system.

1 14. The intercoupling component of claim 13, further comprising:

2 a plurality of shield members formed of electrically conductive material disposed
3 within a plurality of gaps between adjacent segments configured to electrically connect with
4 the chassis ground circuit of the system.

1 15. The intercoupling component of claim 14, further comprising:

2 a frame formed of electrically conductive material surrounding the plurality of
3 segments and in electrical contact with the plurality of shield members.

1 16. The intercoupling component of claim 13, further comprising:

2 a plurality of electrically conductive contacts each disposed within a hole on the
3 upper surface of the segment and configured to releasably retain the array of contacts.

1 17. The intercoupling component of claim 16, wherein at least one of the plurality of
2 electrically conductive contacts is configured to electrically connect with the electrical
3 ground of the system.

1 18. The intercoupling component of claim 16, further comprising:

2 a ground plane disposed at least partially within the segment, wherein the ground
3 plane is configured to electrically connect with the reference ground circuit of the system.

1 19. An intercoupling component for receiving an array of contacts within a digital or
2 analog transmission system having an electrical ground circuit and a chassis ground circuit,
3 the intercoupling component comprising:

4 a segment formed of electrically insulative material and having an upper and lower
 5 surface, the segment including a plurality of holes disposed on its upper surface and arranged
 6 in a predetermined footprint corresponding to the array of a contacts; and

7 a plurality of electrically conductive contacts each disposed within each hole on the
 8 upper surface of the segment, wherein the plurality of contacts are arranged in a plurality of
 9 multi-contact groupings, at least one multi-contact grouping comprising:

10 a first electrically conductive contact; and

11 a reference contact located at a distance D from the first electrically
 12 conductive contact and configured to electrically connect to the electrical ground circuit of
 13 the system.

1 20. The intercoupling component of claim 19, wherein the first electrically conductive
 2 contact and reference form a transmission line electrically equivalent to a co-axial
 3 transmission line.

1 21. The intercoupling component of claim 19, wherein each multi-contact grouping is
 2 located a distance of $\geq D$ from adjacent multi-contact groupings.

1 22. The intercoupling component of claim 19, wherein the first electrically conductive
 2 contact is configured to transmit single-ended signals.

1 23. The intercoupling component of claim 19, further comprising:
 2 a second electrically conductive contact member located at a distance $D2$ from the
 3 first electrically conductive contact.

1 24. The intercoupling component of claim 23, wherein the first and second electrically
 2 conductive contacts form a transmission line electrically equivalent to a twin-axial
 3 differential transmission line.

1 25. The intercoupling component of claim 23, wherein each multi-contact grouping is
 2 located a distance $\geq D2$ from adjacent multi-contact groupings.

- 1 26. The intercoupling component of claim 25, wherein $D > D2$.
- 1 27. The intercoupling component of claim 25, wherein $D=D2$.
- 1 28. The intercoupling component of claim 19, wherein the first and second electrically
2 conductive contacts within each multi-contact grouping are configured to transmit disparate
3 single-ended signals.
- 1 29. The intercoupling component of claim 19, wherein the first and second electrically
2 conductive contacts have substantially the same cross-section.
- 1 30. The intercoupling component of claim 29, wherein the first, second and reference
2 electrically conductive contacts have substantially the same cross-section.
- 1 31. The intercoupling component of claim 19, wherein the first and second electrically
2 conductive contacts have substantially the same initial characteristic impedance.
- 1 32. The intercoupling component of claim 24, wherein the first and second electrically
2 conductive contacts within each multi-contact grouping are configured to transmit low
3 voltage differential signals.
- 1 33. The intercoupling component of claim 32, wherein the differential impedance of the
2 first and second electrically conductive contacts within each multi-contact grouping is
3 approximately 100 ohms.
- 1 34. The intercoupling component of claim 19, further comprising:
2 a shield member formed of electrically conductive material disposed within the
3 segment and configured to electrically connect with the chassis ground circuit of the system.
- 1 35. The intercoupling component of claim 34, further comprising:

2 a frame formed of electrically conductive material surrounding the segment and in
3 electrical contact with the shield member and configured to electrically connect with the
4 chassis ground circuit of the system.

1 36. The intercoupling component of claim 19, further comprising:

2 a plurality of segments formed of electrically insulative material, spaces between
3 adjacent segments defining at least one gap, each segment having an upper and lower surface
4 and including a plurality of holes disposed on its upper surface and arranged in a
5 predetermined footprint corresponding to the array of a contacts; and

6 a shield member formed of electrically conductive material disposed within at least
7 one gap between adjacent segments and is in electrical contact with the electrical ground of
8 the system.

1 37. The intercoupling component of claim 36, further comprising:

2 a frame formed of electrically conductive material surrounding the plurality of
3 segments and in electrical contact with the plurality of shield members and configured to
4 electrically connect with the chassis ground circuit of the system.

1 38. The intercoupling component of claim 19, further comprising:

2 a ground plane disposed at least partially within the segment, wherein the ground
3 plane is configured to electrically connect with the reference ground circuit of the system.

1 39. A circuit card for use in a digital or analog transmission system having an electrical
2 ground circuit and a chassis ground circuit, the circuit card comprising:

3 a printed circuit board having a plurality of contact pads arranged in a predetermined
4 footprint; and

5 an interconnection device comprising:

6 a segment having an upper and lower surface, the segment having a plurality
7 of holes extending through the upper and lower surfaces and arranged in a predetermined
8 footprint to match the predetermined footprint of the plurality of surface mount pads;

9 a plurality of electrically conductive contact member disposed within each of
10 the holes and electrically connected to their respective surface mount pad;

11 a shield member formed of electrically conductive material disposed within
12 the segment;

13 a frame formed of electrically conductive material surrounding the segment,
14 the frame electrically connected the shield member and to the chassis ground circuit of the
15 system.

1 40. The circuit card of claim 39, wherein the plurality of contacts are arranged in a
2 plurality of multi-contact groupings, each multi-contact grouping comprising:

3 a first electrically conductive contact; and

4 a reference contact located at a distance D from the first electrically conductive
5 contact and connected to the electrical ground circuit of the system.

1 41. The circuit card of claim 40, wherein the multi-contact grouping further comprises:

2 a second electrically conductive contact located a distance D2 from the first
3 electrically conductive contact.

1 42. The circuit card of claim 40, wherein the interconnection device further comprises:

2 a ground plane disposed at least partially within the segment, wherein the ground
3 plane is configured to electrically connect with the reference ground circuit of the system.

1 43. The circuit card of claim 41, wherein the first and second electrically conductive
2 contacts form a transmission line electrically equivalent to a twin-axial differential
3 transmission line.

1 44. An intercoupling component for receiving an array of contacts within a digital or
2 analog transmission system having an electrical ground circuit, the intercoupling component
3 comprising:

4 a segment formed of a material having a dielectric constant ϵ_r , and having an upper
5 and lower surface, the segment including a plurality of holes disposed on its upper surface
6 and arranged in a predetermined footprint corresponding to the array of a contacts;

7 a first signal contact disposed within a first hole on the segment; and

8 a second signal contact disposed within a second hole on the segment adjacent to the
9 first hole in which the first signal contact is disposed, and wherein a cavity is formed in the
10 segment between the first and second hole.

1 45. The intercoupling component of claim 44, wherein the cavity is formed on the upper
2 surface of the segment and is open to air.

1 46. The intercoupling component of claim 44, further comprising an insert formed of a
2 material having a dielectric constant of Er_2 , the insert disposed within the cavity.

1 47. The intercoupling component of claim 46, wherein $Er_1 > Er_2$.

1 48. The intercoupling component of claim 46, wherein $Er_1 < Er_2$.

1 49. The intercoupling component of claim 44, wherein the cavity is formed within the
2 segment and is filled with a dielectric material.

1 50. The intercoupling component of claim 49, wherein the dielectric material is air.

1 51. The intercoupling component of claim 44, further comprising a plurality of first
2 signal contacts disposed within a plurality of holes and a plurality of second signal contacts
3 each disposed within a hole that is adjacent to a hole containing a first signal contact, the
4 plurality of first and second signal contacts forming an array of signal contacts, and wherein
5 a cavity is formed in the segment between each pair of first and second signal contacts.

1 52. The intercoupling component of claim 51, further comprising a plurality of ground
2 contacts disposed within a plurality of holes on the segment and disposed within the array of
3 signal contacts, the plurality of ground contacts electrically connected to the electrical ground
4 circuit of the system.

1 53. The intercoupling component of claim 51, further comprising a ground shield
2 disposed with the segment and configured to electrically connect with the electrical ground
3 circuit of the system.

1 54. A method for adjusting the differential impedance of a pair of differential
2 transmission lines in a interconnection device for receiving an array of contacts within a
3 digital or analog transmission system having an electrical ground circuit, the intercoupling
4 component comprising, the method comprising:

5 providing a segment formed of a material having a dielectric constant ϵ_{r1} and having
6 an upper and lower surface, the segment including a plurality of holes disposed on its upper
7 surface;

8 providing a pair of signal contacts disposed within two adjacent holes on the segment,
9 the pair of signal contacts configured to transmit differential signals;

10 spacing the pair of signal contacts such that they create a certain differential
11 impedance between the two contacts in the pair of signal contacts; and

12 providing a cavity in the segment between the two signal contacts in the pair of signal
13 contacts to adjust the differential impedance between the pair of signal contacts.

1 55. The method of claim 54, further comprising:

2 inserting a material having a dielectric constant of ϵ_{r2} in the cavity in the segment.

1 56. The method of claim 54, further comprising:

2 providing a plurality of pairs of signal contacts disposed with a plurality of adjacent
3 holes on the segment, the plurality of pairs of signal contacts forming an array of pairs of
4 signal contacts disposed in the segment; and

5 providing a plurality of cavities disposed in the segment between the two signal
6 contacts in each pair of signal contacts to adjust the differential impedance of the two signal
7 contacts in each pair of signal contacts.

1 57. The method of claim 56, further comprising:

2 providing a plurality of ground contacts disposed within a plurality of holes on the
3 segment and within the array of pairs of signal contacts, the plurality of ground contacts
4 electrically connected to the electrical ground circuit of the system.

1 58. The method of claim 56, further comprising:

- 2 providing a ground plane disposed within the segment and within the array of pairs of
- 3 signal contacts, the ground plane configured to electrically connect with the electrical ground
- 4 of the system.